



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OPP OFFICIAL RECORD
HEALTH EFFECTS DIVISION
SCIENTIFIC DATA REVIEWS
EPA SERIES 361

OFFICE OF
PREVENTION, PESTICIDES, AND
TOXIC SUBSTANCES

19-July-1999

MEMORANDUM

SUBJECT: PP# 7F04910 and 8F04997: **Glufosinate Ammonium Acute and Chronic Dietary Exposure Analysis.** Chemical 128850. DP Barcode D257266. Case 289177. Submission S529287.

FROM: Tom Bloem, Chemist *TB*
RAB1/HED (7509C)

THRU: Melba Morrow, D.V.M., Branch Senior Scientist, RAB1/HED (7509C) *Melba Morrow*
Sheila Piper, Chemist, CEB1/HED (7509C) *Sheila Piper*
William Cutchin, Chemist, RAB2/HED (7509C) *William Cutchin*

TO: Tom Bloem, Chemist
RAB1/HED (7509C)

Action Requested

AgrEvo USA Company has requested a Section 3 registration for use of glufosinate ammonium on potatoes, transgenic sugar beets and transgenic canola (PP#s 7F04910 & 8F04997) and the State of Minnesota has requested a Section 18 exemption for use of glufosinate ammonium on transgenic sweet corn. Acute and chronic dietary exposure analyses are requested.

Executive Summary

Both the acute and chronic DEEM™ analyses used consumption data from USDA's 1989-1992 nationwide Continuing Survey for Food Intake by Individuals (CSFII).

The acute dietary exposure analysis for females 13+ (no acute dietary endpoint was identified for the general US population including infants and children) assumed tolerance level residues and 100% crop treated for all registered and proposed commodities (Tier 1 analysis). The most highly exposed population was females 13+/nursing at 58% acute population adjusted dose (aPAD, 0.012131 mg/kg/day, 95th percentile). Acute dietary food exposure to glufosinate ammonium is below HEDs level of concern.

The chronic dietary exposure analysis assumed tolerance level residues for all registered and proposed commodities. The weighted average percent crop treated was incorporated for all registered commodities (Tier 2 analysis). The most highly exposed population was children 1-6 years old at 71% cPAD (0.004974 mg/kg/day). Chronic dietary food exposure to glufosinate ammonium is below HEDs level of concern.

Toxicological Information

The toxicological data base for glufosinate ammonium was evaluated by Hazard Identification Assessment Review Committee on May 5, 1999. The dietary endpoints chosen are outlined in the table below. The FQPA Safety Factor Committee met on May 10, 1999 to evaluate the hazard and exposure data for glufosinate ammonium and recommended that the FQPA Safety Factor be reduced to 3x in assessing the risk posed by this chemical (3x applicable to all populations subgroups and risk assessments).

| exposure scenario | dose (mg/kg/day) | endpoint | study |
|------------------------------|--------------------------------------|---|---|
| acute dietary | NOAEL = 6.3 ¹ UF = 300 | LOAEL = 20 mg/kg/day based on decreased fetal body weight and increased fetal death RfD = 0.063 acute population adjusted dose (aPAD) = 0.021 mg/kg (females 13+only) no Acute RfD established for the general population including infants and children | developmental toxicity-rabbit |
| chronic dietary (non-cancer) | NOAEL = 2.1 ¹ UF = 300 | LOAEL = 6.8 / 8.2 mg/kg/day in males / females based on increased kidney weight and kidney/brain weight in males at 52 weeks, and decreased survival in females at 130 weeks. RfD = 0.021 chronic population adjusted dose (cPAD) = 0.007 mg/kg day | Two-year chronic toxicity/oncogenicity in rat |
| chronic dietary (cancer) | | glufosinate ammonium did not demonstrate evidence of carcinogenic potential | |

¹ 100x for intra and inter species variation; 3x FQPA Safety Factor

Residue Information

Time-limited tolerances are established for the combined residues of glufosinate ammonium and its metabolite, 3-methylphosphinico propionic acid, in/on apples (0.05 ppm), grapes (0.05 ppm), bananas (0.2 ppm) and the tree nut group (0.1 ppm). Time limited tolerances are also established for these two compounds as a result of secondary residues in milk (0.02 ppm), eggs (0.05 ppm), and the meat (0.05 ppm), fat (0.05 ppm) and meat byproducts (0.10 ppm) of ruminants and poultry (40 CFR 180.473(a) and (b)). Glufosinate ammonium is registered for use on transgenic soybeans and corn. The tolerance expression for commodities derived from transgenic crops includes glufosinate ammonium, 3-methylphosphinico propionic acid and N-acetyl glufosinate. Time limited tolerances are established in/on transgenic field corn grain (0.2 ppm) and transgenic soybeans (2.0 ppm) (40 CFR 180.473(c)). A Section 18 request from Wisconsin for use of glufosinate ammonium on transgenic sweet corn has been approved (D253382; 4.0 ppm tolerance).

The tolerance established on sweet corn (4.0 ppm) as a result of the Wisconsin Section 18 is applicable to the Minnesota Section 18 sweet corn request (same application scenarios). Based on the submitted crop field trial and processing studies, the following tolerances for the combined residues of glufosinate ammonium, 3-methylphosphinico propionic acid and N-acetyl glufosinate, are appropriate:

| | |
|----------------------------|---------|
| Sugar Beet, Root | 0.9 ppm |
| Sugar Beet, Molasses | 5.0 ppm |
| Canola Seed | 0.4 ppm |
| *Potato | 0.8 ppm |
| *Potato, processed | 1.6 ppm |
| *Potato, flakes | 2.0 ppm |

* tolerance for combined residues of glufosinate ammonium and its metabolite 3-methylphosphinico propionic acid (non-transgenic crop)

The acute dietary exposure analysis assumed tolerance level residues and 100% crop treatment for all registered and proposed commodities (Tier 1 analysis).

The chronic dietary exposure analysis assumed tolerance level residues for all registered and proposed commodities and incorporated the weighted average percent crop treated (BEAD; A. Halvorson, 15-Apr-1999; Attachment #3) for all registered commodities (Tier 2 analysis). Sweet corn percent crop treated was maintained at 100% due to the possibility that other states may request the same Section 18.

Acute and Chronic Dietary Exposure

Summary of Results from Acute DEEMTM Analysis for Glufosinate Ammonium

| subgroups | exposure ¹ (mg/kg/day) | % aPAD |
|--|--------------------------------------|--------|
| Females (13+, preg., not nursing) | 0.008179 | 39 |
| Females (13+, nursing) | 0.012131 | 58 |
| Females (13-19 yrs., not preg., not nursing) | 0.008425 | 40 |
| Females (20+ years, not preg., not nursing) | 0.007086 | 34 |
| Females (13-50 years) | 0.007751 | 37 |

¹ 95th percentile exposures, consumption data from USDA's 1989-1992 nationwide Continuing Survey for Food Intake by Individuals (CSFII)

Summary of Results from Chronic DEEMTM Analysis for Glufosinate ammonium

| subgroups | exposure ² (mg/kg/day) | % cPAD |
|----------------------------------|--------------------------------------|--------|
| U.S. Population (48 states) | 0.002120 | 30 |
| Non-Hispanic blacks | 0.002246 | 32 |
| Non-Hispanic/non-white/non-black | 0.002256 | 32 |
| Non-Hispanic whites | 0.002132 | 31 |
| Children (1-6 years) | 0.004974 | 71 |
| Females (13+ nursing) | 0.002035 | 29 |
| Males 13-19 yrs | 0.002449 | 35 |

¹ The subgroups listed above are the following: (1) US Population, (2) the other general subgroups for which the %cPAD is greater than that of the US Population and (3) the most highly exposed population among infants and children, females, and males.

² consumption data from USDA's 1989-1992 nationwide Continuing Survey for Food Intake by Individuals (CSFII)

Results and Discussion

Both the acute and chronic DEEM™ analyses used consumption data from USDA's 1989-1992 nationwide Continuing Survey for Food Intake by Individuals (CSFII).

The acute dietary exposure analysis for females 13+ (no acute dietary endpoint was identified for the general US population including infants and children) assumed tolerance level residues and 100% crop treated for all registered and proposed commodities (Tier 1 analysis). The most highly exposed population was females 13+/nursing at 58% acute population adjusted dose (aPAD, 0.012131 mg/kg/day, 95th percentile). Acute dietary food exposure to glufosinate ammonium is below HEDs level of concern.

The chronic dietary exposure analysis assumed tolerance level residues for all registered and proposed commodities. The weighted average percent crop treated was incorporated for all registered commodities (Tier 2 analysis). The most highly exposed population was children 1-6 years old at 71% cPAD (0.004974 mg/kg/day). Chronic dietary food exposure to glufosinate ammonium is below HEDs level of concern.

Attachment 1: Acute Dietary Exposure Estimates and Residue File
Attachment 2: Chronic Dietary Exposure Estimates and Residue File
Attachment 3: % crop treated; BEAD, A. Halvorson, 15-Apr-1999

cc with attachments: M. Sahafeyen (CEB1)
RDI: S. Piper & W. Cutchin (28-Jun-1999), M. Morrow (29-Jun-1999)
T. Bloem:CM#2: 806-R:(703)605-0217

Attachment 1: Acute Dietary Exposure Estimates and Residue File

U.S. Environmental Protection Agency Ver. 6.78
DEEM ACUTE analysis for GLUFOSINATE AMMONIUM (1989-92 data)
Residue file: 128850a.r96 Adjustment factor #2 NOT used.
Analysis Date: 07-14-1999/08:59:57 Residue file dated: 07-14-1999/08:54:56/8
Acute Reference Dose (aRfD) = 0.021000 mg/kg body-wt/day
NOEL (Acute) = 6.300000 mg/kg body-wt/day
Run Comment: acute & chronic UF; 10(intra) 10(inter) 3(FQPA); total UF 300

Summary calculations:

| 95th Percentile Exposure % aRfD | 99th Percentile MOE | | 99.9th Percentile Exposure % aRfD | MOE | Exposure % aRfD | MOE |
|------------------------------------|------------------------|-----|--------------------------------------|-------|-----------------|----------|
| <hr/> | | | | | | |
| Females (13+/preg/not nsg): | | | | | | |
| 0.008179 | 38.95 | 770 | 0.012634 | 60.16 | 498 | 0.013158 |
| Females (13+/nursing): | | | | | | |
| 0.012131 | 57.77 | 519 | 0.013682 | 65.15 | 460 | 0.017500 |
| Females (13-19 yrs/np/nn): | | | | | | |
| 0.008425 | 40.12 | 747 | 0.018479 | 87.99 | 340 | 0.026188 |
| Females (20+ years/np/nn): | | | | | | |
| 0.007086 | 33.74 | 889 | 0.013461 | 64.10 | 468 | 0.024239 |
| Females (13-50 years): | | | | | | |
| 0.007751 | 36.91 | 812 | 0.014686 | 69.93 | 428 | 0.025741 |

Chemical name: glufosinate ammonium

RfD(Chronic): .007 mg/kg bw/day NOEL(Chronic): 2.1 mg/kg bw/day

RfD(Acute): .021 mg/kg bw/day NOEL(Acute): 6.3 mg/kg bw/day

Date created/last modified: 07-14-1999/08:54:56/8

Program ver. 6.77

Comment: acute & chronic UF; 10(intra) 10(inter) 3(FQPA); total UF 300

| Food | Crop | | RESIDUE | RDF | Adj.Factors | Comment |
|--|------|---------------------------------|----------|-----|-------------|------------------------|
| Code | Grp | Food Name | (ppm) | # | #1 | #2 |
| 40 | 14 | Almonds | 0.100000 | 0 | 1.000 | 1.000 |
| 52 | 11 | Apples | 0.050000 | 0 | 1.000 | 1.000 |
| 53 | 11 | Apples-dried | 0.050000 | 0 | 8.000 | 1.000 |
| 54 | 11 | Apples-juice/cider | 0.050000 | 0 | 1.300 | 1.000 |
| 377 | 11 | Apples-juice-concentrate | 0.050000 | 0 | 3.900 | 1.000 |
| 72 | O | Bananas | 0.200000 | 0 | 1.000 | 1.000 |
| Full comment: residue expected in pulp after peel is removed | | | | | | |
| 73 | O | Bananas-dried | 0.200000 | 0 | 3.900 | 1.000 |
| Full comment: residue expected in pulp after peel is removed | | | | | | |
| 378 | O | Bananas-juice | 0.200000 | 0 | 1.000 | 1.000 |
| Full comment: residue expected in pulp after peel is removed | | | | | | |
| 51 | 14 | Beech-nuts | 0.100000 | 0 | 1.000 | 1.000 |
| 323 | M | Beef-dried | 0.050000 | 0 | 1.920 | 1.000 |
| 324 | M | Beef-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 325 | M | Beef-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 327 | M | Beef-lean (fat/free) w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 326 | M | Beef-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 321 | M | Beef-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 322 | M | Beef-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 41 | 14 | Brazil nuts | 0.100000 | 0 | 1.000 | 1.000 |
| 49 | 14 | Butter nuts | 0.100000 | 0 | 1.000 | 1.000 |
| 301 | O | Canola oil (rape seed oil) | 0.400000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 42 | 14 | Cashews | 0.100000 | 0 | 1.000 | 1.000 |
| 43 | 14 | Chestnuts | 0.100000 | 0 | 1.000 | 1.000 |
| 366 | P | Chicken-byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 368 | P | Chicken-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 367 | P | Chicken-giblets(liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 385 | P | Chicken-giblets (excl. liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 369 | P | Chicken-lean/fat free w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 267 | 15 | Corn grain-bran | 0.200000 | 0 | 1.000 | 1.000 |
| 266 | 15 | Corn grain-endosperm | 0.200000 | 0 | 1.000 | 1.000 |
| 289 | 15 | Corn grain-oil | 0.200000 | 0 | 1.000 | 1.000 |
| 268 | 15 | Corn grain/sugar/hfcs | 0.200000 | 0 | 1.500 | 1.000 |
| 388 | 15 | Corn grain/sugar-molasses | 0.200000 | 0 | 1.500 | 1.000 |
| 238 | 15 | Corn/sweet | | | | |
| | | 11-Uncooked | 4.000000 | 0 | 1.000 | 1.000 |
| | | 12-Cooked: NFS | 4.000000 | 0 | 1.000 | 1.000 |
| | | 13-Baked | 4.000000 | 0 | 1.000 | 1.000 |
| | | 14-Boiled | 4.000000 | 0 | 1.000 | 1.000 |
| | | 32-Canned: Cooked | 4.000000 | 0 | 1.000 | 1.000 |
| | | 34-Canned: Boiled | 4.000000 | 0 | 1.000 | 1.000 |
| | | 35-Canned: Fried | 4.000000 | 0 | 1.000 | 1.000 |
| | | 42-Frozen: Cooked | 4.000000 | 0 | 1.000 | 1.000 |
| 364 | P | Eggs-white only | 0.050000 | 0 | 1.000 | 1.000 |
| 363 | P | Eggs-whole | 0.050000 | 0 | 1.000 | 1.000 |
| 365 | P | Eggs-yolk only | 0.050000 | 0 | 1.000 | 1.000 |
| 44 | 14 | Filberts (hazelnuts) | 0.100000 | 0 | 1.000 | 1.000 |
| 330 | M | Goat-fat w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 331 | M | Goat-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 333 | M | Goat-lean (fat/free) w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 332 | M | Goat-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 328 | M | Goat-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 329 | M | Goat-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 13 | O | Grapes | 0.050000 | 0 | 1.000 | 1.000 |
| 15 | O | Grapes-juice | 0.050000 | 0 | 1.200 | 1.000 |
| 392 | O | Grapes-juice-concentrate | 0.050000 | 0 | 3.600 | 1.000 |
| 195 | O | Grapes-leaves | 0.050000 | 0 | 1.000 | 1.000 |
| 14 | O | Grapes-raisins | 0.050000 | 0 | 4.300 | 1.000 |
| 315 | O | Grapes-wine and sherry | 0.050000 | 0 | 1.000 | 1.000 |
| 45 | 14 | Hickory nuts | 0.100000 | 0 | 1.000 | 1.000 |
| 334 | M | Horsemeat | 0.050000 | 0 | 1.000 | 1.000 |
| 46 | 14 | Macadamia nuts (bush nuts) | 0.100000 | 0 | 1.000 | 1.000 |

| | | | | | | |
|-----|----|----------------------------------|----------|---|-------|------------------------|
| 398 | D | Milk-based water | 0.020000 | 0 | 1.000 | 1.000 |
| 319 | D | Milk-fat solids | 0.020000 | 0 | 1.000 | 1.000 |
| 318 | D | Milk-nonfat solids | 0.020000 | 0 | 1.000 | 1.000 |
| 320 | D | Milk sugar (lactose) | 0.020000 | 0 | 1.000 | 1.000 |
| 47 | 14 | Pecans | 0.100000 | 0 | 1.000 | 1.000 |
| 344 | M | Pork-fat w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 345 | M | Pork-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 347 | M | Pork-lean (fat free) w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 346 | M | Pork-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 342 | M | Pork-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 343 | M | Pork-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 210 | 1C | Potatoes/white-dry | 2.000000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 209 | 1C | Potatoes/white-peeled | 0.800000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 211 | 1C | Potatoes/white-peel only | 0.800000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 208 | 1C | Potatoes/white-unspecified | 2.000000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 207 | 1C | Potatoes/white-whole | 0.800000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 362 | P | Poultry-other-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 361 | P | Poultry-other-giblets(liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 360 | P | Poultry-other-lean (fat free) w/ | 0.050000 | 0 | 1.000 | 1.000 |
| 338 | M | Sheep-fat w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 339 | M | Sheep-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 341 | M | Sheep-lean (fat free) w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 340 | M | Sheep-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 336 | M | Sheep-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 337 | M | Sheep-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 303 | 6A | Soybean-other | 2.000000 | 0 | 1.000 | 1.000 |
| 307 | 6A | Soybeans-flour (defatted) | 2.000000 | 0 | 1.000 | 1.000 |
| 306 | 6A | Soybeans-flour (low fat) | 2.000000 | 0 | 1.000 | 1.000 |
| 305 | 6A | Soybeans-flour (full fat) | 2.000000 | 0 | 1.000 | 1.000 |
| 304 | 6A | Soybeans-mature seeds dry | 2.000000 | 0 | 1.000 | 1.000 |
| 297 | 6A | Soybeans-oil | 2.000000 | 0 | 1.000 | 1.000 |
| 482 | O | Soybeans-protein isolate | 2.000000 | 0 | 1.000 | 1.000 |
| 255 | 6A | Soybeans-sprouted seeds | 2.000000 | 0 | 0.330 | 1.000 |
| 282 | 1A | Sugar-beet | 0.900000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 379 | 1A | Sugar-beet-molasses | 5.000000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 355 | P | Turkey-byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 357 | P | Turkey--fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 356 | P | Turkey-giblets (liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 358 | P | Turkey- lean/fat free w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 449 | P | Turkey-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 429 | M | Veal-dried | 0.050000 | 0 | 1.920 | 1.000 |
| 424 | M | Veal-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 426 | M | Veal-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 425 | M | Veal-lean (fat free) w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 427 | M | Veal-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 430 | M | Veal-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 428 | M | Veal-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 431 | 14 | Walnut oil | 0.100000 | 0 | 1.000 | 1.000 |
| 48 | 14 | Walnuts | 0.100000 | 0 | 1.000 | 1.000 |

Attachment 2: Chronic Dietary Exposure Estimates and Residue File

U.S. Environmental Protection Agency
 DEEM Chronic analysis for GLUFOSINATE AMMONIUM Ver. 6.76
 Residue file name: C:\DEEM\resdata\128850c.r96 (1989-92 data)
 Analysis Date 07-14-1999/08:58:01 Adjustment factor #2 used.
 Reference dose (Rfd, CHRONIC) = .007 mg/kg bw/day
 COMMENT 1: acute & chronic UF; 10(intra-) 10(inter) 3(FQPA); total UF 300
 =====
 Total exposure by population subgroup

| Total Exposure | | |
|------------------------------------|-------------------|----------------|
| Population Subgroup | mg/kg body wt/day | Percent of Rfd |
| U.S. Population (total) | 0.002120 | 30.3% |
| U.S. Population (spring season) | 0.002059 | 29.4% |
| U.S. Population (summer season) | 0.002189 | 31.3% |
| U.S. Population (autumn season) | 0.002062 | 29.5% |
| U.S. Population (winter season) | 0.002162 | 30.9% |
| Northeast region | 0.002107 | 30.1% |
| Midwest region | 0.002388 | 34.1% |
| Southern region | 0.002123 | 30.3% |
| Western region | 0.001807 | 25.8% |
| Hispanics | 0.001786 | 25.5% |
| Non-hispanic whites | 0.002132 | 30.5% |
| Non-hispanic blacks | 0.002246 | 32.1% |
| Non-hisp/non-white/non-black) | 0.002256 | 32.2% |
| All infants (< 1 year) | 0.001930 | 27.6% |
| Nursing infants | 0.000599 | 8.6% |
| Non-nursing infants | 0.002491 | 35.6% |
| Children 1-6 yrs | 0.004974 | 71.1% |
| Children 7-12 yrs | 0.003480 | 49.7% |
| Females 13-19(not preg or nursing) | 0.001800 | 25.7% |
| Females 20+ (not preg or nursing) | 0.001476 | 21.1% |
| Females 13-50 yrs | 0.001570 | 22.4% |
| Females 13+ (preg/not nursing) | 0.001624 | 23.2% |
| Females 13+ (nursing) | 0.002035 | 29.1% |
| Males 13-19 yrs | 0.002449 | 35.0% |
| Males 20+ yrs | 0.001645 | 23.5% |
| Seniors 55+ | 0.001553 | 22.2% |
| Pacific Region | 0.001746 | 24.9% |

Chemical name: glufosinate ammonium

RfD(Chronic): .007 mg/kg bw/day NOEL(Chronic): 2.1 mg/kg bw/day

RfD(Acute): .021 mg/kg bw/day NOEL(Acute): 6.3 mg/kg bw/day

Date created/last modified: 07-14-1999/08:53:45/8

Program ver. 6.77

Comment: acute & chronic UF; 10(intra-) 10(inter) 3(FQPA); total UF 300

| Food | Crop | | RESIDUE | RDF | Adj.Factors | Comment |
|--|------|---------------------------------|----------|-----|-------------|------------------------|
| Code | Grp | Food Name | (ppm) | # | #1 | #2 |
| 40 | 14 | Almonds | 0.100000 | 0 | 1.000 | 0.010 |
| 52 | 11 | Apples | 0.050000 | 0 | 1.000 | 0.010 |
| 53 | 11 | Apples-dried | 0.050000 | 0 | 8.000 | 0.010 |
| 54 | 11 | Apples-juice/cider | 0.050000 | 0 | 1.300 | 0.010 |
| 377 | 11 | Apples-juice-concentrate | 0.050000 | 0 | 3.900 | 0.010 |
| 72 | O | Bananas | 0.200000 | 0 | 1.000 | 1.000 |
| Full comment: residue expected in pulp after peel is removed | | | | | | |
| 73 | O | Bananas-dried | 0.200000 | 0 | 3.900 | 1.000 |
| Full comment: residue expected in pulp after peel is removed | | | | | | |
| 378 | O | Bananas-juice | 0.200000 | 0 | 1.000 | 1.000 |
| Full comment: residue expected in pulp after peel is removed | | | | | | |
| 51 | 14 | Beech-nuts | 0.100000 | 0 | 1.000 | 0.010 |
| 323 | M | Beef-dried | 0.050000 | 0 | 1.920 | 1.000 |
| 324 | M | Beef-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 325 | M | Beef-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 327 | M | Beef-lean (fat/free) w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 326 | M | Beef-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 321 | M | Beef-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 322 | M | Beef-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 41 | 14 | Brazil nuts | 0.100000 | 0 | 1.000 | 0.010 |
| 49 | 14 | Butter nuts | 0.100000 | 0 | 1.000 | 0.010 |
| 301 | O | Canola oil (rape seed oil) | 0.400000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 42 | 14 | Cashews | 0.100000 | 0 | 1.000 | 0.010 |
| 43 | 14 | Chestnuts | 0.100000 | 0 | 1.000 | 0.010 |
| 366 | P | Chicken-byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 368 | P | Chicken-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 367 | P | Chicken-giblets(liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 385 | P | Chicken-giblets (excl. liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 369 | P | Chicken-lean/fat free w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 267 | 15 | Corn grain-bran | 0.200000 | 0 | 1.000 | 0.026 |
| 266 | 15 | Corn grain-endosperm | 0.200000 | 0 | 1.000 | 0.026 |
| 289 | 15 | Corn grain-oil | 0.200000 | 0 | 1.000 | 0.026 |
| 268 | 15 | Corn grain/sugar/hfcs | 0.200000 | 0 | 1.500 | 0.026 |
| 388 | 15 | Corn grain/sugar-molasses | 0.200000 | 0 | 1.500 | 0.026 |
| 238 | 15 | Corn/sweet | | | | |
| | | 11-Uncooked | 4.000000 | 0 | 1.000 | 1.000 |
| | | 12-Cooked: NFS | 4.000000 | 0 | 1.000 | 1.000 |
| | | 13-Baked | 4.000000 | 0 | 1.000 | 1.000 |
| | | 14-Boiled | 4.000000 | 0 | 1.000 | 1.000 |
| | | 32-Canned: Cooked | 4.000000 | 0 | 1.000 | 1.000 |
| | | 34-Canned: Boiled | 4.000000 | 0 | 1.000 | 1.000 |
| | | 35-Canned: Fried | 4.000000 | 0 | 1.000 | 1.000 |
| | | 42-Frozen: Cooked | 4.000000 | 0 | 1.000 | 1.000 |
| 364 | P | Eggs-white only | 0.050000 | 0 | 1.000 | 1.000 |
| 363 | P | Eggs-whole | 0.050000 | 0 | 1.000 | 1.000 |
| 365 | P | Eggs-yolk only | 0.050000 | 0 | 1.000 | 1.000 |
| 44 | 14 | Filberts (hazelnuts) | 0.100000 | 0 | 1.000 | 0.010 |
| 330 | M | Goat-fat w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 331 | M | Goat-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 333 | M | Goat-lean (fat/free) w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 332 | M | Goat-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 328 | M | Goat-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 329 | M | Goat-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 13 | O | Grapes | 0.050000 | 0 | 1.000 | 0.010 |
| 15 | O | Grapes-juice | 0.050000 | 0 | 1.200 | 0.010 |
| 392 | O | Grapes-juice-concentrate | 0.050000 | 0 | 3.600 | 0.010 |
| 195 | O | Grapes-leaves | 0.050000 | 0 | 1.000 | 0.010 |
| 14 | O | Grapes-raisins | 0.050000 | 0 | 4.300 | 0.010 |
| 315 | O | Grapes-wine and sherry | 0.050000 | 0 | 1.000 | 0.010 |
| 45 | 14 | Hickory nuts | 0.100000 | 0 | 1.000 | 0.010 |
| 334 | M | Horsemeat | 0.050000 | 0 | 1.000 | 1.000 |
| 46 | 14 | Macadamia nuts (bush nuts) | 0.100000 | 0 | 1.000 | 0.010 |

| | | | | | | |
|-----|----|----------------------------------|----------|---|-------|------------------------|
| 398 | D | Milk-based water | 0.020000 | 0 | 1.000 | 1.000 |
| 319 | D | Milk-fat solids | 0.020000 | 0 | 1.000 | 1.000 |
| 318 | D | Milk-nonfat solids | 0.020000 | 0 | 1.000 | 1.000 |
| 320 | D | Milk sugar (lactose) | 0.020000 | 0 | 1.000 | 1.000 |
| 47 | 14 | Pecans | 0.100000 | 0 | 1.000 | 0.010 |
| 344 | M | Pork-fat w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 345 | M | Pork-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 347 | M | Pork-lean (fat free) w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 346 | M | Pork-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 342 | M | Pork-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 343 | M | Pork-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 210 | 1C | Potatoes/white-dry | 2.000000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 209 | 1C | Potatoes/white-peeled | 0.800000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 211 | 1C | Potatoes/white-peel only | 0.800000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 208 | 1C | Potatoes/white-unspecified | 2.000000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 207 | 1C | Potatoes/white-whole | 0.800000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 362 | P | Poultry-other-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 361 | P | Poultry-other-giblets(liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 360 | P | Poultry-other-lean (fat free) w/ | 0.050000 | 0 | 1.000 | 1.000 |
| 338 | M | Sheep-fat w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 339 | M | Sheep-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 341 | M | Sheep-lean (fat free) w/o bone | 0.050000 | 0 | 1.000 | 1.000 |
| 340 | M | Sheep-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 336 | M | Sheep-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 337 | M | Sheep-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 303 | 6A | Soybean-other | 2.000000 | 0 | 1.000 | 0.010 |
| 307 | 6A | Soybeans-flour (defatted) | 2.000000 | 0 | 1.000 | 0.010 |
| 306 | 6A | Soybeans-flour (low fat) | 2.000000 | 0 | 1.000 | 0.010 |
| 305 | 6A | Soybeans-flour (full fat) | 2.000000 | 0 | 1.000 | 0.010 |
| 304 | 6A | Soybeans-mature seeds dry | 2.000000 | 0 | 1.000 | 0.010 |
| 297 | 6A | Soybeans-oil | 2.000000 | 0 | 1.000 | 0.010 |
| 482 | O | Soybeans-protein isolate | 2.000000 | 0 | 1.000 | 0.010 |
| 255 | 6A | Soybeans-sprouted seeds | 2.000000 | 0 | 0.330 | 0.010 |
| 282 | 1A | Sugar-beet | 0.900000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 379 | 1A | Sugar-beet-molasses | 5.000000 | 0 | 1.000 | 1.000 7F04910, 8F04997 |
| 355 | P | Turkey-byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 357 | P | Turkey--fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 356 | P | Turkey-giblets (liver) | 0.100000 | 0 | 1.000 | 1.000 |
| 358 | P | Turkey- lean/fat free w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 449 | P | Turkey-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 429 | M | Veal-dried | 0.050000 | 0 | 1.920 | 1.000 |
| 424 | M | Veal-fat w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 426 | M | Veal-kidney | 0.100000 | 0 | 1.000 | 1.000 |
| 425 | M | Veal-lean (fat free) w/o bones | 0.050000 | 0 | 1.000 | 1.000 |
| 427 | M | Veal-liver | 0.100000 | 0 | 1.000 | 1.000 |
| 430 | M | Veal-meat byproducts | 0.100000 | 0 | 1.000 | 1.000 |
| 428 | M | Veal-other organ meats | 0.100000 | 0 | 1.000 | 1.000 |
| 431 | 14 | Walnut oil | 0.100000 | 0 | 1.000 | 0.010 |
| 48 | 14 | Walnuts | 0.100000 | 0 | 1.000 | 0.010 |

Attachment 3: % crop treated; BEAD, A. Halvorson, 15-Apr-1999

GLUFOSINATE %CROP TREATED BASED ON 1995-1998 DATA, AGRICULTURAL CROPS
Alan Halvorson, EAB/BEAD, 4/15/99

| | -- Wtd Average -- | | --- Maximum --- | | |
|--------------------|-------------------|-----------------|-----------------|-----------------|---------------|
| | A plntd (000) | A trtd (000) | % trtd (%) | A trtd (000) | % trtd (%) |
| ALMONDS | 438 | 0 | 0.0% | 0 | 0.0% |
| APPLES | 635 | 2 | 0.3% | 4 | 0.6% |
| CHERRIES | 126 | 0 | 0.0% | 0 | 0.0% |
| CORN | 77,831 | 2,000 | 2.6% | 3,100 | 4.0% |
| GRAPEVINES | 876 | 0 | 0.0% | 0 | 0.0% |
| LOTS/FARMSTEAD/ETC | 22,848 | 0 | 0.0% | 0 | 0.0% |
| PEACHES | 235 | 0 | 0.0% | 0 | 0.0% |
| PEARS | 83 | 0 | 0.0% | 0 | 0.0% |
| PECAN | 494 | 0 | 0.0% | 0 | 0.0% |
| PLUMS/PRUNES | 139 | 0 | 0.0% | 0 | 0.0% |
| SOYBEANS | 67,593 | 10 | 0.01% | 13 | 0.02% |
| WALNUTS | 205 | 0 | 0.0% | 0 | 0.0% |
| OTHER NUT TREES | 114 | 0 | 0.0% | 0 | 0.0% |

Note -- Data indicate usage on corn has been increasing over the past few years

13544

002437

Chemical: Glufosinate-ammonium

PC Code: 128850
HED File Code 11000 Chemistry Reviews
Memo Date: 07/19/99
File ID: DPD257266
Accession Number: 412-01-0084

HED Records Reference Center
01/19/2001